SYLLABUS
LINEAR ALGEBRA

by
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INFORMATICS ENGINEERING DEPARTMENT
UNIVERSITAS PENDIDIKAN GANESHA
SINGARAJA
TAHUN AKADEMIK 2022/2023

SYLLABUS

I. COURSE IDENTITY

Study Program	: Computer Science
Course	: Linear Algebra
Code	: KOMS120301
Semester	: III
SKS	: 3 (Theory)
Prerequisite	: Basic Mathematics
Lecturer	: Ni Luh Dewi Sintiari, Ph.D.

II. COURSE DECRIPTION

Linear Algebra course discusses the basics of Linear Algebra related to Computer Science and can be implemented in the field of Computer Science. The material discussed in this course includes the concepts of matrices and vectors, systems of linear equations, determinants and inverses of square matrices, Euclid's vector space, basis and dimensions of vector spaces, linear transformations, eigenvalues and eigenvectors, inner product space, diagonalization, decomposition. singular values, and the application of linear algebra.

III. LESSON OUTCOMES

1. Attitude
   - S1. Pious of the God Almighty and able to show a religious attitude.
   - S2. Upholding human values in carrying out duties based on religion, morals, and ethics.
   - S8. Internalize academic values, norms and ethics.
   - S9. Demonstrate an attitude of responsibility for work in their field of expertise independently.
   - S10. Internalize the spirit of independence, struggle, and entrepreneurship.

2. Knowledge
   - P1. Able to understand and master the basic concepts of computer science in general such as mathematics, algorithms, programming, and databases.
   - P2. Able to understand and master the concept of software development, starting from requirements analysis, design, development, and implementation of software.

3. General Skill
   - KU1. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and

technology that pays attention to and applies humanities values in accordance with the field of computer science.

KU2. Able to demonstrate independent, quality, and measurable performance.

KU3. Able to study the implications of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with the field of computer science based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism.

4. Spesific Skill

KK1. Skilled in analyzing requirements, designing, and implementing designs, and testing software.

IV. LEARNING METHOD

The learning method used is the lecture method, cooperative learning, presentation, and group work.

V. REFERENCE

1. Elementary Linear Algebra (Applications Version) Ed. 11, Howard Anton & Chris Rorres
2. Slide Kuliah Aljabar Linier (in Indonesian), by Rinaldi Munir, Institut Teknologi Bandung.
3. Lecture slides Linear Algebra, by Dewi Sintiari

VI. OUTLINE OF LEARNING PLAN

No.	Capaian Pembelajaran (CP)	Learning Outcomes	Topics
1	S1, S2, S8, S9, S10, P1, P2, KU1, KU2	Students are able to understand the role of Linear Algebra in Computer Science as well as the basic topics of mathematics supporting Linear Algebra course.	Introduction to Linear Algebra
2	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KU3, KK1	Students are able to understand the concept of matrices, types of matrices, and operations on matrices, and apply them in problem solving properly and correctly.	Matrices
3	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KU3, KK1	Students are able to understand the concept of the System of Linear Equations (SLE), the representation of the SLE in the form of a matrix, as well as the operations that can be performed to solve the SLE, and implement them in problem solving properly and correctly.	System of Linear Equations
4	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to apply Gaussian elimination and Gauss-Jordan elimination methods to solve multi-variable SLE properly and correctly.	Gaussian Elimination dan Gauss-Jordan Elimination
5	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to apply the method of calculating determinants (either combinatorial or with cofactor expansion) to compute determinants of matrices and use them in problem solving properly and correctly.	Determinants
6	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of the inverse of a square matrix, as well as its relationship to determinants and SLE, and apply it in problem solving properly and correctly.	Inverses
7	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of vectors in spaces $R^{2,}$ R^3, and R^n, as well as operations related to them.	VecTors
8	MIDTERM EVALUATION		
9	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of Euclid's vector space, general vector space, and sub-vector space, as well as related operations (addition and multiplication of scalar vectors) and apply them in solving simple problems properly and correctly.	Vector Space
10	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of spanned sets in vector space and linear combinations between vectors in vector space, and apply the concepts to find the standard/non-standard basis and compute the dimensions of vector spaces properly and correctly.	Basis and Dimension of Vector Space
11	S1, S2, S8, S9, S10, P1, P2,	Students are able to perform transformation	Basis

	KU1, KU2, KK1	between bases in a vectors space, and relate it to the column, row, and null spaces.	Transformations, Column/Row/Null spaces
12	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KU3, KK1	Students are able to understand the concept of linear transformation and solve related problems properly and correctly.	Linear Transformation
13	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concepts of eigenvalues, eigenvectors, eigenspaces, and matrix diagonalizations, and solve related problems properly and correctly.	Eigenvalues and Eigenvectors
14	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of inner product and related operations, inner product space, Gram-Schmidt procedure, and solve related problems properly and correctly.	Inner Product Spcae
15	S1, S2, S8, S9, S10, P1, P2, KU1, KU2, KK1	Students are able to understand the concept of matrix decomposition, such as QR decomposition, LU decomposition, and singular value decomposition, and solve related problems properly and correctly.	Singular Value Decomposition
16	FINAL EVALUATION		

Approved by,
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